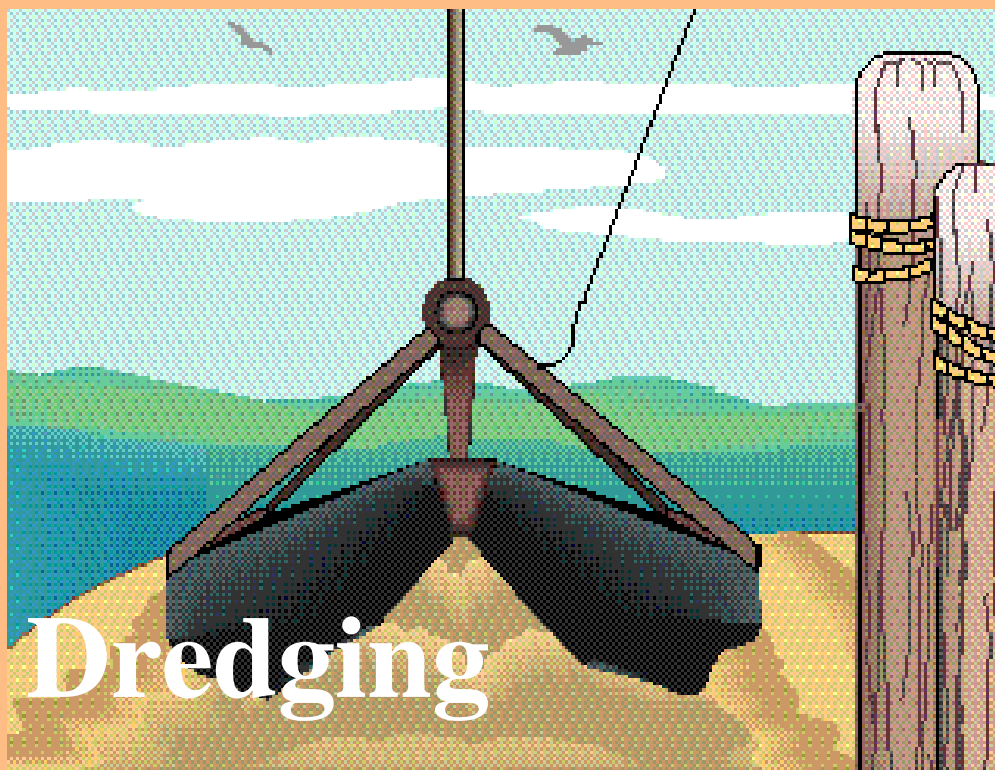
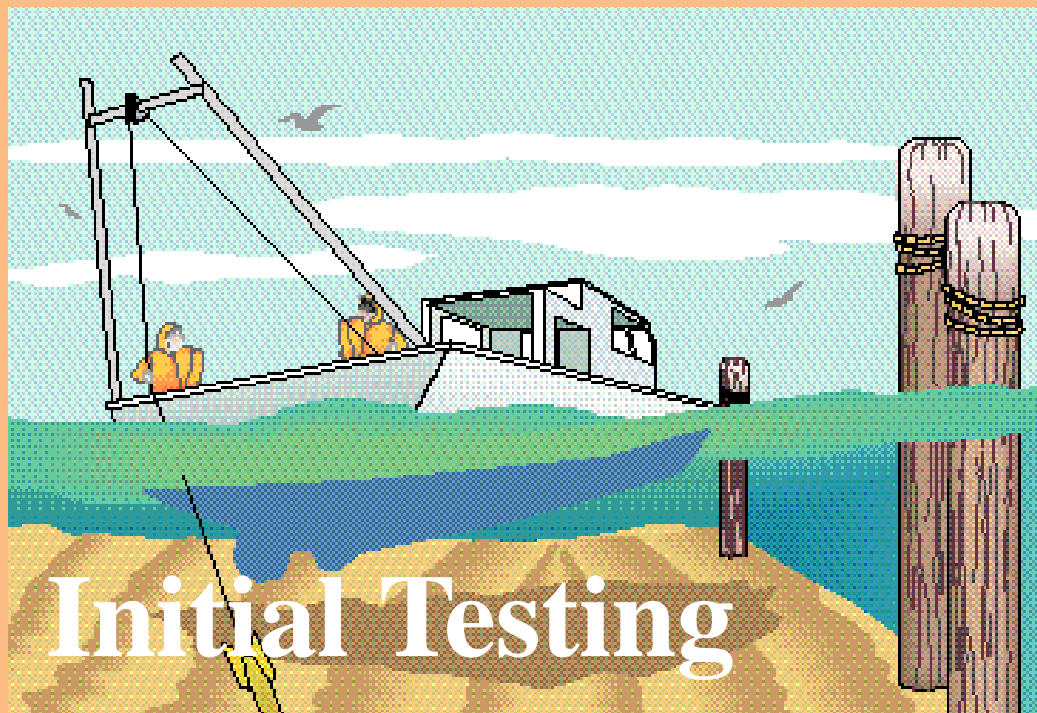




US Army Corps  
of Engineers  
New England District

# Dredged Material Management Program



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## ***Introduction***

*The U.S. Army Corps of Engineers, in fulfilling its mission to maintain and improve the nation's waterways that are critical to commerce and national defense, is responsible for conducting or managing the dredging and disposal of more than 250 million cubic yards of sediment each year. About 2 million cubic yards of dredging occurs annually in New England. The New England District (NAE) of the Corps, with regional responsibility for several important ports on the northeast coast of the U.S., has historically been a leader in dredged material disposal management.*

These responsibilities have been met through a flexible, creative effort that includes:

- Dredged material management through regulation and technical guidance
- Disposal monitoring
- Disposal site research

This brochure provides the background behind NAE's efforts in dredged material management, monitoring, and research.



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## What Is Dredging?

Dredging is the removal of rocks, sand, gravel, mud, and clay from the bottom of waterways to create or maintain sufficient depth for navigation or other purposes. The material should not be confused with wastes such as sludge, hazardous waste, medical waste, or plastics and other floatables. The sediment is scraped, scooped, or pumped up by dredging vessels which transfer it to barges, hoppers or on-shore facilities for disposal.



## Why Is Dredging Necessary?

Every river or stream carries naturally suspended soil washed by erosion into its waters. Some of this suspended sediment will settle out along the river's path to the ocean, with the largest amount being deposited at the river's mouth or entry to an estuary. Ocean currents and storms also move and deposit sediment along the shoreline. These natural processes would eventually lead to the filling of our harbors and waterways with sand, mud, or clay. If no dredging were performed, our harbors and major rivers, so vital to commercial and defense activities, would eventually shoal, leading to vessel delays and groundings. Today's container ships, oil tankers and modern naval vessels need deep channels and docking facilities to move freely. Dredging is necessary to maintain America's waterborne commerce and defense capability.

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## Why The U.S. Army Corps Of Engineers?

The Corps' historical responsibility for managing dredged material disposal activities in U.S. waters dates back to its regulatory authority under the Rivers and Harbors Act of 1899. The Corps' more recent activities in this regard have been strengthened by provisions of the Clean Water Act (Section 404) and the Marine Protection, Research and Sanctuaries Act (Section 103). As part of the Corps' nationwide program, the New England District reviews approximately 200 dredging and dredged material disposal permit applications each year, as well as ensures maintenance dredging of, and improvements to, more than 100 congressionally authorized Federal navigation projects serving the five coastal states in New England. The Corps' efforts are not restricted to purely engineering work. Our responsibility includes ensuring that "unacceptable adverse effects" to the aquatic environment are avoided. The Corps' operating guidelines specify three conditions for compliance in this regard:

- There is no practicable alternative that would have less adverse impact on the environment
- The dredging or disposal operation will not violate applicable water quality standards or other environmental regulations
- All appropriate and practicable steps have been taken to minimize potential adverse impact on the environment

## What Is The Corps' Dredged Material Management Approach?

In impartially weighing the benefits and risks of each dredging and disposal proposal, the Corps is neither a proponent nor opponent of individual permit proposals and congressionally authorized dredging projects. Its job is to balance protection and use of our important natural resources. The Corps' evaluation of a proposed dredging project includes determining whether alternatives have been fully addressed, from the basic standpoint of the need for



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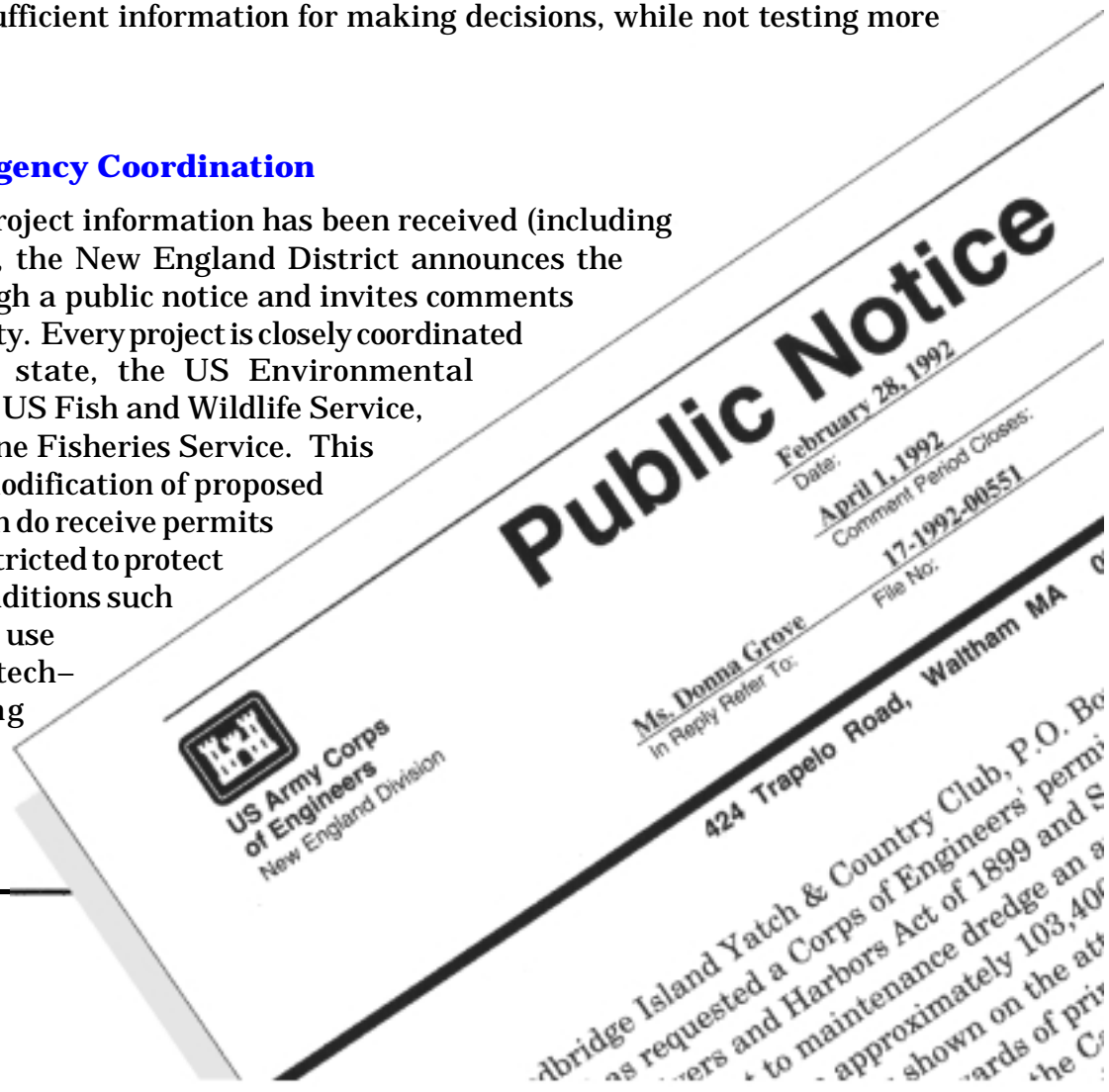
dredging (project modification), to evaluation of potential disposal options. As part of this review, the Corps considers the nature of the proposed dredged material, including the degree to which sediments are contaminated. Disposal options may vary depending on the degree of sediment contamination.

### **Project Evaluation**

Frequently, the Corps requires testing of sediments to be dredged as part of the evaluation of a proposed project. The Corps uses a tiered, or hierarchical, approach to testing and evaluation which allows the use of a necessary and sufficient level of testing for each specific dredging operation. The initial tiers use existing information and relatively simple, rapid procedures for determining potential environmental impact of the dredged material in question. For certain dredged material that either obviously does or does not have the potential for environmental impact, information collected in the initial tiers may be sufficient for making decisions. However, more extensive evaluation may be needed for other materials with less clear potential for impact or for which inadequate information exists. Successive tiers use more intensive evaluation procedures that provide more detailed information. For example, biological tests to determine toxicity or potential food chain impacts may be required if existing information, grain size, or bulk chemistry data are insufficient to enable a determination on a proposed dredging project. The intent of the tiered approach is to use resources efficiently by testing only as intensively as necessary to provide sufficient information for making decisions, while not testing more than necessary.

### **Public Notice and Agency Coordination**

Once all required project information has been received (including results of any testing), the New England District announces the proposed project through a public notice and invites comments from any interested party. Every project is closely coordinated with the appropriate state, the US Environmental Protection Agency, the US Fish and Wildlife Service, and the National Marine Fisheries Service. This review often leads to modification of proposed projects. Projects which do receive permits may be additionally restricted to protect the environment by conditions such as a requirement to use certain construction techniques or by placing seasonal restrictions on operations.





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## Inspections

For those projects which are permitted following careful review and, in some cases considerable modification, a “cradle-to-grave” system of project management is implemented which includes Corps-supervised compliance inspections, and post-disposal monitoring for open water disposal operations.

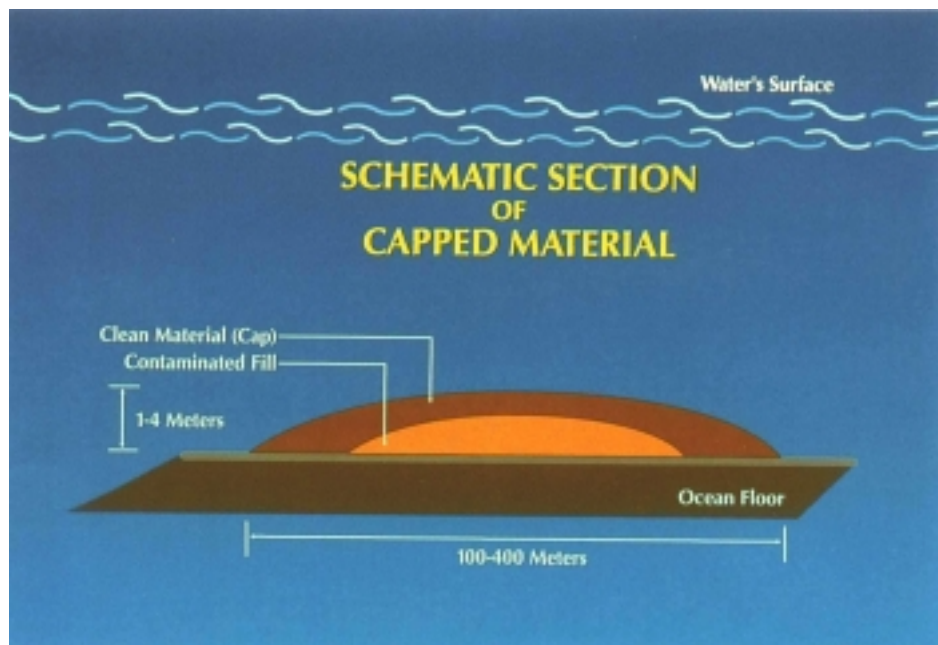
Prior to each dredging and disposal operation the Corps must be notified by phone so that permits can be checked. An on-board Corps-approved inspector is then assigned to assure that open water disposal operations are conducted as specified in the permit. In cases where permit conditions are not met, severe penalties can be imposed on contractors or permittees.

## Research and Monitoring

The Corps also maintains several research facilities, including the Waterways Experiment Station in Vicksburg, Mississippi, where scientists study the various aspects of dredged material and develop and evaluate different disposal techniques. The Corps is concerned with the characteristics of dredged material, the effects of disposal, the evaluation of potential disposal sites, and what beneficial uses can be made of the material and disposal sites. In addition, the Corps seeks out well-respected university and industry scientists to assist in designing and implementing an effective open water disposal site monitoring program.

## What Options Are Available Concerning Dredged Material Disposal?

About 90 to 95% of dredged material is considered to have low or undetectable contaminant levels and can be used in a variety of beneficial projects. Such dredged sediments have been used to create new islands and marshes which serve as breeding grounds for birds and marine animals. Clean sand from dredging operations also is used for beach nourishment after tides and storms



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have washed sand offshore. In urban areas, dredged materials have been used as landfill for the creation of industrial developments and municipal projects, such as Boston's Logan Airport, and as sanitary landfill cover. Another use of sediments with low or no contaminant levels is as "cap" material for ocean disposal operations. Dredged materials can also be deposited offshore to create shallower areas which become attractive feeding and breeding grounds for a variety of fish.

The safe disposal of the 5 to 10% of dredged material which may contain elevated levels of contaminants (such as heavy metals, PCBs and other organic compounds) requires special handling procedures to meet strict federal guidelines. The Corps of Engineers utilizes a technique called "capping" to minimize adverse effects on the environment when contaminated dredged material must be disposed of at sea. Contaminated material is covered with clean sediment (the "cap") which prevents the resuspension and dispersal of the contaminated material. Numerous studies have found that contaminants are generally so tightly attached to the sediment in which they are found that they do not leach into the overlying cap; therefore the cap effectively isolates the contaminated materials from the sea life and ocean above.

The storage of dredged materials in diked upland containment areas also has been used in some instances. Upland sites large enough to construct containment areas are hard to find in New England. Also, construction requirements to prevent possible contamination of groundwater make them expensive to build and maintain. However, for small projects, local upland sites are sometimes identified and permitted. The use of ocean disposal sites is the most common means of dredged material disposal in New England since no regional upland disposal sites currently exist.

### **How is Ocean Disposal Safely Accomplished?**



The selection and approval of open water disposal sites involves extensive study and coordination among governmental agencies. These include the Army Corps of Engineers, the Environmental Protection Agency, the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, and concerned states. The public also has opportunity to comment before approval of sites is finalized.

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Most locations are specifically chosen to ensure that disposal sites are not situated in areas with strong bottom currents which might cause erosion of the disposed material. During the disposal site selection phase, all proposed sites are also studied to determine bottom topography, sediment type (such as sand or mud), fisheries resources, and local bottom-dwelling “benthic” communities. In addition, the levels of trace metals and hydrocarbons normally found in the sediment and in the body tissue of the local marine animals are determined.

The primary concerns during most disposal operations are that the dredged material is placed accurately at the site, that the material covers as small an area as possible, and that it remains there. Precise electronic navigation, buoys to mark the actual disposal point, and on-site disposal inspectors are all used to ensure compliance.

### **How Is Ocean Disposal In New England Monitored?**

In 1977 the New England District of the U.S. Army Corps of Engineers initiated the Disposal Area Monitoring System (DAMOS) to investigate the physical, biological, and chemical impacts of ocean disposal of dredged material at sites in the northeast. DAMOS was developed in New England, specifically because of a recognized need for managing the more contaminated sediments found in New England ports and harbors.



The DAMOS team includes experts in physical, chemical, and biological oceanographic sciences, along with ocean engineers who conduct scientific studies before, during, and after disposal to determine the effects of dredged sediments and to make recommendations for avoiding and minimizing adverse effects. The DAMOS team utilizes state-of-the-art technology and innovative techniques in its monitoring program.

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## How Are The Specific Disposal Operations Monitored?



Precision navigation techniques and disposal point buoys ensure accurate placement of dredged materials at selected sites. Periodic surveys of the ocean bottom at each disposal site are compared to the original pre-disposal surveys as further verification that dredged material has been accurately placed. Studies are also conducted to monitor the recolonization of the disposal site by the types of organisms which previously lived in the area, using a special underwater camera which penetrates into surface sediments. Under some circumstances, underwater surveys by divers, submersibles, or remotely operated vehicles (ROVs) are conducted to get a first-hand picture of the disposal site.

## Why Conduct Post-Disposal Monitoring?

Perhaps the most important contribution of the DAMOS program has been the emphasis on post-disposal monitoring. From a compliance point of view, post-disposal monitoring is essential to ensuring, on a long-term basis, that disposal of the dredged material has had no adverse effect on the environment.



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**Key elements of the monitoring program include:**

- Assessing the physical integrity and stability of the disposal mounds, with emphasis on identifying possible erosion and transport of material away from the sites. For example, the DAMOS program has shown that Long Island Sound disposal mounds remained intact after the passage of Hurricane Gloria in 1985.
- Assessment of impacts to bottom organisms around and returning to the disposal mounds.
- Assessment of the effectiveness of any capping operation in isolating disposed contaminated sediments.



**Why Is Continuing Disposal Monitoring And Research Necessary?**

In managing the disposal of dredged material, NAE has long understood that good decision-making depends on good information. As a result, a dynamic, focused monitoring and research program has always been an essential element of NAE's dredged material management program.

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**The range of management decisions necessary before permitting open water disposal of dredged material is broad and includes consideration of:**

- Dredging and disposal alternatives based on environmental and economic considerations
- Proposed method and time (season) of dredging
- Environmental conditions at or near the proposed disposal site
- Quantity and degree of contamination of the material to be dredged

The ability to knowledgeably address these issues has depended on the Corps' flexibility in approach and willingness to commit resources to a comprehensive research program. Regulations, policies, and technical guidance prepared and used by the Corps daily are based in large part on analyses of results from specific research program studies. Over \$100 million has been committed to date under Federal monitoring and research programs, including the Dredged Material Research Program of the Waterways Experiment Station, the Environmental Effects of Dredging Programs, and the New England District's DAMOS program.

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**Specific capabilities and technologies that have resulted from the DAMOS program include:**

- High accuracy ( $\pm 3\text{m}$ ) at-sea navigation coupled with precision fathometers (depth finders) enabling detailed analysis of disposal mound topography before, during, and after disposal
- Remote underwater sediment profile photography allowing documentation of organism/sediment relationships as they naturally occur in the seafloor
- Quantitative measurement of the effectiveness of isolating contaminated dredged material by capping operations
- Development of a sophisticated but flexible tiered monitoring approach to assess the potential adverse impact of any dredging or dredged material disposal activity
- Improved capping techniques

While the results of past studies have allowed the Corps to develop an extensive and effective regulatory and monitoring program, less expensive, faster and more accurate techniques for predicting and assessing the effects of dredged material disposal on the aquatic environment are still required. Based on this need, innovative new evaluation procedures are under development both within the New England District and throughout the Corps' dredged material management programs.



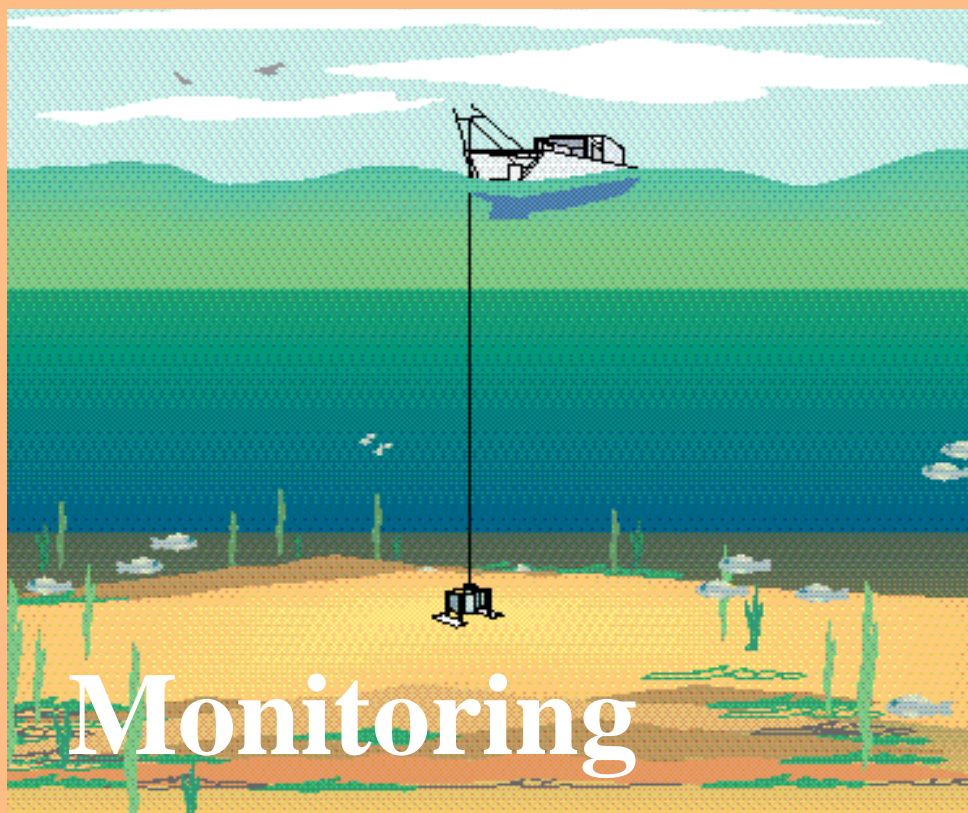


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# Monitoring



# Disposal

